



APPLICATION FORM

All applications must include the following information. Separate applications must be submitted for each eligible program. **Deadline: June 1, 2018.** Please include this application form with electronic entry. If you do not receive an email confirming receipt of your entry within 3 days of submission, please contact [Gage Harter](#).

PROGRAM INFORMATION

County: Isle of Wight
Program Title: Using GIS to Improve Erosion and Sedimentation Control Inspection Program Efficiency
Program Category: Environmental, Information Technology

CONTACT INFORMATION

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SIGNATURE OF COUNTY ADMINISTRATOR OR DEPUTY/ASSISTANT COUNTY ADMINISTRATOR

Name: Randy Keaton
Title: County Administrator
Signature:  FOR RANDY KEATON



Local Roots, Global Reach

ISLE OF WIGHT COUNTY, VIRGINIA

2018 VACo Achievement Award Nomination

Using GIS to Improve the Accuracy and Efficiency of Erosion and Sedimentation Control Inspections

Isle of Wight County, Virginia

Executive Summary

Working together, the Isle of Wight County Stormwater Management and Geographic Information System (GIS) Offices developed a more accurate and efficient way of determining when erosion and sedimentation inspections are needed at individual construction sites. Using National Weather Service rainfall data and specialized software, staff produced mapping products that pin-pointed only those sites receiving enough rainfall to require inspection. Additionally, the new process is much less likely to overlook isolated pockets of heavy rainfall that might otherwise go unreported.

The new process keeps our operational costs low, has been in place for over a year and takes a technician 15-20 minutes to complete. It prevents unnecessary inspections and improves accuracy to ensure sites needing inspection are not missed. Development and deployment required no additional resources and overall, saves staff time; allowing a single inspector, supplemented by our environmental programs coordinator, to cover the entire county. It uses off-the-shelf technology and can be replicated by any organization that bases inspection schedules on rainfall quantity.



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Overview:

Isle of Wight County staff saw the need for an improved way to determine which construction sites need erosion and sedimentation control inspections and which do not. Department of Environmental Quality (DEQ) regulations require site inspections anytime ½-inch or more of rain has fallen. Most rainfall reports note a single value for the entire county; approximately 320 square miles. By using National Weather Service (NWS) data, staff is able to obtain accurate rainfall values for each of 51, 6.5 square mile grid sections covering the county.

Working together, the Isle of Wight County Stormwater Management and Geographic Information System (GIS) Offices developed a more accurate and efficient way of determining when erosion and sedimentation inspections are needed at individual construction sites. Using National Weather Service rainfall data along with specialized mapping and database software, staff produced mapping products that pin-pointed only those sites receiving enough rainfall to require inspection. Additionally, the new process is much less likely to overlook isolated pockets of heavy rainfall that might otherwise go unreported.

The improved process has been in place for over a year and takes a single technician 15-20 minutes to complete; preventing unnecessary inspections and improving accuracy to ensure sites needing inspection are not missed. Development and deployment required no additional resources and overall, saves staff time; allowing a single inspector, supplemented by our environmental programs coordinator, to cover the entire county. It uses off-the-shelf technology and can be replicated by any organization that bases inspection schedules on rainfall quantity.



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Need for the Program

State environmental regulations dictate that whenever a construction site receives one-half inch of precipitation (rain) or more in a 24-hour period, the site must be inspected to ensure erosion and sedimentation control practices are effective and still functioning. In Isle of Wight County, these inspections are performed by staff in the Stormwater Division of our Utility Services Department.

Historically, inspectors have been dispatched to all active construction sites whenever local weather reports indicated that ½ inch or more of rain has fallen. These rainfall reports represent observations generalized over a wide area and may not represent rainfall amounts at a specific location. It wasn't unusual for our inspectors to arrive at a site only to find that it had received little or no rain; inspection was likely not required. At times, we were clearly sending county staff to inspect more sites than necessary and more importantly, it's possible we were missing sites subject to isolated pockets of heavy rain on days that were generally dry.

Seeking a better way to determine which construction sites need to be inspected and which do not, the County's Stormwater Engineer met with the GIS Manager to discuss possible

solutions. Their goal was to develop a more technically sound, yet fiscally responsible program to ensure erosion and sedimentation control inspections were scheduled and occurred as required by state regulations...but with an increase in overall efficiency. In short; a better way to ensure nothing gets missed, and unnecessary inspections do not occur.

Program Description

County staff from the Stormwater Division and GIS Office reviewed several possible solutions including the purchase of rain gauges and use of National Weather Service (NWS) data. We eventually settled on a methodology using precipitation data published by the NWS. The raw NWS data is processed into mapping layers and products using GIS software from ESRI, Inc. Once the data has been fully processed, staff can determine precisely which construction sites require inspections and which do not. County GIS staff worked to develop the processes associated with data capture/download and ArcGIS data manipulation and Stormwater Division staff developed processes for integrating the higher-resolution precipitation data in a way that allows for precise scheduling of construction site inspections (using the county's MUNIS software).

NWS Data. Stormwater staff download precipitation data daily from the [NWS Advanced Hydrologic Prediction Service webpage](#). NWS data collection and processing methodology are state-of-the-art in meteorology. Specific methodology can be found on their "[About the Precipitation Analysis Pages](#)" webpage. Essentially, the NWS uses a combination of radar estimates and ground-based observations to produce a standardized grid of observation points. They've been doing this for years and have considerable expertise; the NWS is much more adept at determining precipitation amounts than County staff would ever be. Each NWS rainfall data point has a standardized location (latitude/longitude) and is tagged with 24-hour rainfall totals. For an example of how the NWS data looks in a map, [click here](#).

ArcGIS Processing. ArcGIS software is used to create two products: a map, and a spreadsheet. [The map](#) shows NWS data values with those same values also interpolated to allow for color representation of areas with “less than” or “equal or greater than” ½-inch of rain.

Using the ArcGIS “Make NetCDF Feature Layer” tool, the NWS data is converted to a GIS shapefile (points). The NWS values are then interpolated via the “spline” method using another ArcGIS tool; the resulting map gives both a historical record and an easy visual guide/que. The next important step in the process is to marry up the NWS values with the appropriate grid section; accomplished via a “spatial join. With the grid number and precipitation values joined, [the resulting spreadsheet](#) allows staff to focus on only those grids that actually received over ½-inch of rain. The “IOW_ID” values represent labels for each of 51 grid sections making up the entire county. The center of each grid is the location of the NWS precipitation reporting point.

Determining Inspection Requirements. Isle of Wight County uses the MUNIS database system to keep track of construction sites, permitting and inspections. Within MUNIS, Stormwater Division staff tag each new construction site with the grid number it falls within. Once the rainfall products have been created, a simple query within MUNIS produces a product listing all construction sites needing inspections on a given day (if you know which grids need inspecting and each site is tagged with the grid number it falls within...you’re set!). County inspection staff is then dispatched to only those construction sites requiring erosion and sedimentation control inspections.

Program Costs and Use of Technology

Development of the program utilized existing Isle of Wight County staff. No additional funds were expended creating this new and improved process. Raw precipitation data is published daily by the National Weather Service Wakefield, VA office in “NetCDF” format. This is a NWS standard product posted on their website and does not require any special

requests, staff time, or other resources on the part of the NWS. The GIS and MUNIS software used to configure the raw data and make database queries is already in the County software inventory and available to staff. No additional resources or requests were necessary!

The Results/Success of the Program

Quote from Isle of Wight County's Chief Engineer: "This approach allows us to monitor an area of literally hundreds of square miles with just one full time E&E inspector supplemented by our environmental programs coordinator, thus keeping our operational costs for E&S inspections low". The overall process has been in place for over a year and stormwater division staff have been trained to complete all data download and processing tasks. Completing the data download and processing seldom takes a single technician more than 20-minutes. This new, innovative use of GIS and MUNIS database technologies has resulted in fewer unnecessary inspections and a considerable savings of staff time. Our new decision-making process is also standardized and well documented, using state-of-the-art technology to effect considerable savings of a critical resource (staff time).

Worthiness of an Award

Isle of Wight County staff's innovative use of National Weather Service Data to create a more efficient and accurate inspection process represents local government working at its best. Using existing staff, a little research, and learning the complexities of advanced GIS methods is paying dividends every day; leveraging technology to allow fewer inspectors to do an even better job. This process can be replicated by other localities and is an excellent example of the type of quality solution possible when County departments work together to best serve our citizens.